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The Power of Feedback

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Feedback is one of the most powerful influences on learning and achievement, but this impact can be either positive or negative. Its power is frequently mentioned in articles about learning and teaching, but surprisingly few recent studies have systematically investigated its meaning. This article provides a conceptual analysis of feedback and reviews the evidence related to its impact on learning and achievement. This evidence shows that although feedback is among the major influences, the type of feedback and the way it is given can be differentially effective. A model of feedback is then proposed that identifies the particular properties and circumstances that make it effective, and some typically thorny issues are discussed, including the timing of feedback and the effects of positive and negative feedback. Finally, this analysis is used to suggest ways in which feedback can be used to enhance its effectiveness in classrooms.

KEYWORDS: feedback, assessment, student and teacher learning.

Although it is often mentioned in articles about learning and teaching, surprisingly few recent studies have systematically investigated the meaning of feedback in classrooms. In this article, we begin with a conceptual analysis of the meaning of feedback and a synthesis of the evidence related to the power of feedback to improve teaching and learning. We then propose a model of feedback that is used to identify the circumstances under which feedback has the greatest impact. Specifically, the research evidence related to the different types of feedback and their effectiveness in terms of promoting student learning are discussed, the different ways students deal with feedback are described, and the relationship between assessment and feedback is provided. Finally, the model, together with the evidence underpinning it, is used to show how feedback can be used to enhance classroom learning and teaching.

The Meaning of Feedback

In this review, feedback is conceptualized as information provided by an agent (e.g., teacher, peer, book, parent, self, experience) regarding aspects of one's performance or understanding. A teacher or parent can provide corrective information, a peer can provide an alternative strategy, a book can provide information to clarify ideas, a parent can provide encouragement, and a learner can look up the answer to evaluate the correctness of a response. Feedback thus is a "consequence" of performance.

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To assist in understanding the purpose, effects, and types of feedback, it is useful to consider a continuum of instruction and feedback. At one end of the continuum is a clear distinction between providing instruction and providing feedback. However, when feedback is combined with more a correctional review, the feedback and instruction become intertwined until "the process itself takes on the forms of new instruction, rather than informing the student solely about correctness" (Kulhavy, 1977, p. 212). To take on this instructional purpose, feedback needs to provide information specifically relating to the task or process of learning that fills a gap between what is understood and what is aimed to be understood (Sadler, 1989), and it can do this in a number of different ways. These may be through affective processes, such as increased effort, motivation, or engagement. Alternatively, the gap may be reduced through a number of different cognitive processes, including restructuring understandings, confirming to students that they are correct or incorrect, indicating that more information is available or needed, pointing to directions students could pursue, and/or indicating alternative strategies to understand particular information. Winne and Butler (1994) provided an excellent summary in their claim that "feedback is information with which a learner can confirm, add to, overwrite, tune, or restructure information in memory, whether that information is domain knowledge, meta-cognitive knowledge, beliefs about self and tasks, or cognitive tactics and strategies" (p. 5740).

Feedback has no effect in a vacuum; to be powerful in its effect, there must be a learning context to which feedback is addressed. It is but part of the teaching process and is that which happens second—after a student has responded to initial instruction—when information is provided regarding some aspect(s) of the student's task performance. It is most powerful when it addresses faulty interpretations, not a total lack of understanding. Under the latter circumstance, it may even be threatening to a student: "If the material studied is unfamiliar or abstruse, providing feedback should have little effect on criterion performance, since there is no way to relate the new information to what is already known" (Kulhavy, 1977, p. 220).

The focus of this article on feedback as information about the content and/or understanding of the constructions that students have made from the learning experience is not the same as a behaviorist input-output model. Contrary to the behaviorists' argument, Kulhavy (1977) demonstrated that feedback is not necessarily a reinforcer, because feedback can be accepted, modified, or rejected. Feedback by itself may not have the power to initiate further action. In addition, it is the case that feedback is not only given by teachers, students, peers, and so on, but can also be sought by students, peers, and so on, and detected by a learner without it being intentionally sought.

The Effectiveness of Feedback

The first question to ask is, How effective is feedback? We answer this question by referring to the usual effects of schooling on student achievement and then comparing them with the evidence related to feedback. Hattie (1999) reported a synthesis of over 500 meta-analyses, involving 450,000 effect sizes from 180,000 studies, representing approximately 20 to 30 million students, on various influences on student achievement. This analysis included more than 100 factors influencing educational achievement and covered various aspects of those typically

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TABLE 1
Summary of effect sizes from 12 meta-analyses assessing the influences of feedback

Study	Context	Number of effects	Effect size
Skiba, Casey, and Center (1985-1986)	For special education students	35	1.24
Lysakowski and Walberg (1982)	Cues, corrective feedback	54	1.13
Walberg (1982)	Cues, motivational influences, and reinforcement	19	0.81
Tenenbaum and Goldring (1989)	Cues, participation, reinforcement, feedback, and correctives	15	0.74
Rummel and Feinberg (1988)	Extrinsic feedback rewards	45	0.60
Yeany and Miller (1983)	Diagnostic feedback in science	49	0.52
Kluger and De Nisi (1996)	Feedback	470	0.38
L'Hommedieu, Menges, and Brinko (1990)	From student ratings	28	0.34
Moin (1986)	Feedback		0.29
Bangert-Drowns, Kulik, Kulik, and Morgan (1991)	From testing	40	0.28
Kulik and Kulik (1988)	Immediate versus delayed	53	0.28
Getsie, Langer, and Glass (1985)	Rewards and punishments	89	0.14
Wilkinson (1981)	Teacher praise	14	0.12

identified, such as attributes of schools, homes, students, teachers, and curricula. The average or typical effect of schooling was 0.40 ($SE = 0.05$), and this provided a benchmark figure or "standard" from which to judge the various influences on achievement, such as that of feedback.

At least 12 previous meta-analyses have included specific information on feedback in classrooms (Table 1). These meta-analyses included 196 studies and 6,972 effect sizes. The average effect size was 0.79 (twice the average effect). To place this average of 0.79 into perspective, it fell in the top 5 to 10 highest influences on achievement in Hattie's (1999) synthesis, along with direct instruction (0.93), reciprocal teaching (0.86), students' prior cognitive ability (0.71), and also can be contrasted with other influences such as acceleration (0.47), socioeconomic influences (0.44), homework (0.41), the use of calculators (0.24), reducing class size (0.12), and retention back 1 year (–0.12). Clearly, feedback can be powerful.

The effect sizes reported in the feedback meta-analyses, however, show considerable variability, indicating that some types of feedback are more powerful

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TABLE 2
Summary of effect sizes relating to feedback effects

Variable	Number of meta-analyses	Number of studies	Number of effects	Effect size
Cues	3	89	129	1.10
Feedback	74	4,157	5,755	0.95
Reinforcement	1	19	19	0.94
Video or audio feedback	1	91	715	0.64
Computer-assisted instructional feedback	4	161	129	0.52
Goals and feedback	8	640	121	0.46
Student evaluation feedback	3	100	61	0.42
Corrective feedback	25	1,149	1,040	0.37
Delayed versus immediate	5	178	83	0.34
Reward	3	223	508	0.31
Immediate versus delayed	8	398	167	0.24
Punishment	1	89	210	0.20
Praise	11	388	4,410	0.14
Programmed instruction	1	40	23	–0.04

than others. Those studies showing the highest effect sizes involved students receiving information feedback about a task and how to do it more effectively. Lower effect sizes were related to praise, rewards, and punishment.

A more detailed synthesis of 74 meta-analyses in Hattie's (1999) database that included some information about feedback (across more than 7,000 studies and 13,370 effect sizes, including those in Table 2) demonstrated that the most effective forms of feedback provide cues or reinforcement to learners; are in the form of video-, audio-, or computer-assisted instructional feedback; and/or relate to goals. Programmed instruction, praise, punishment, and extrinsic rewards were the least effective for enhancing achievement (Table 3). Indeed, it is doubtful whether rewards should be thought of as feedback at all. Deci, Koestner, and Ryan (1999) described tangible rewards (stickers, awards, etc.) as contingencies to activities rather than feedback because they contain such little task information. In their meta-analysis of the effects of feedback on motivation, these authors found a negative correlation between extrinsic rewards and task performance (–0.34). Tangible rewards significantly undermined intrinsic motivation, particularly for interesting tasks (–0.68) compared with uninteresting tasks (0.18). In addition, when the feedback was administered in a controlling manner (e.g., saying that students performed as they "should" have performed), the effects were even worse (–0.78). Thus, Deci et al. concluded that extrinsic rewards are typically negative because they "undermine people's taking responsibility for motivating or regulating themselves" (p. 659). Rather, they are a controlling strategy that often leads to greater surveillance, evaluation, and competition, all of which have been found to undermine enhanced engagement and regulation (Deci & Ryan, 1985).

The most systematic study addressing the effects of various types of feedback was conducted by Kluger and DeNisi (1996). Their meta-analysis included studies of

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TABLE 3
Summary of effect sizes relating to types of feedback

Moderator	Number of effects	Effect size
Correct feedback		
'Tis correct	114	0.43
'Tis incorrect	197	0.25
Task feedback about changes from previous trials		
Yes	50	0.55
No	380	0.28
Task feedback designed to discourage the student		
Yes	49	−0.14
No	388	0.33
Praise feedback about the task		
Yes	80	0.09
No	358	0.34
Feedback provided from a computer		
Yes	87	0.41
No	337	0.23
Number of times feedback was provided		
Lots	97	0.32
Little	171	0.39
Task complexity		
Very complex	107	0.03
Not complex	114	0.55
Goal setting		
Difficult goals	37	0.51
Easy, do your best goals	373	0.30
Threat to self-esteem		
Much threat	102	0.08
Little threat	170	0.47

Source. Kluger and DeNisi (1996).

feedback interventions that were not confounded with other manipulations, included at least a control group, measured performance, and included at least 10 participants. Many of their studies were not classroom based. From the 131 studies, they estimated 470 effect sizes on the basis of 12,652 participants and 23,663 observations (reflecting multiple observations per participant). The average effect size was 0.38 (SE = 0.09), and 32% of the effects were negative (Table 3). Over all comparisons, it appears that the power of feedback is influenced by the direction of the feedback relative to performance on a task. Specifically, feedback is more effective when it provides information on correct rather than incorrect responses and when it builds on changes from previous trails. The impact of feedback was also influenced by the difficulty of goals and tasks. It appears to have the most impact when goals are specific

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and challenging but task complexity is low. Praise for task performance appears to be ineffective, which is hardly surprising because it contains such little learning-related information. It appears to be more effective when there are perceived low rather than high levels of threat to self-esteem, presumably because low-threat conditions allow attention to be paid to the feedback.

Given these mixed effects of feedback, we devote the remainder of this article to identifying the conditions that maximize the positive effects on learning. A model of feedback is used as a framework to understand why particular kinds of feedback promote learning effectively and why some others do not.

A Model of Feedback

Figure 1 presents a framework in which feedback can be considered. The claim is made that the main purpose of feedback is to reduce discrepancies between current understandings and performance and a goal. Strategies students and teachers use to reduce this discrepancy may be more or less effective in enhancing learning, so it is important to understand the circumstances that result in the differential outcomes. Effective feedback must answer three major questions asked by a teacher and/or by a student: Where am I going? (What are the goals?), How am I going? (What progress is being made toward the goal?), and Where to next? (What activities need to be undertaken to make better progress?) These questions correspond to notions of feed up, feed back, and feed forward. How effectively answers to these questions serve to reduce the gap is partly dependent on the level at which the feedback operates. These include the level of task performance, the level of process of understanding how to do a task, the regulatory or metacognitive process level, and/or the self or personal level (unrelated to the specifics of the task). Feedback has differing effects across these levels.

A key theme arising from this review of the literature is the importance of ensuring that feedback is targeted at students at the appropriate level, because some feedback is effective in reducing the discrepancy between current understandings and what is desired, and some is ineffective. These issues are explored in greater depth as each aspect of the model is further explored.

How Feedback Works: Reducing the Discrepancy Between Current and Desired Understanding

There are many possible ways for students to reduce the gap between current and desired understandings in response to feedback, and they are not always effective in enhancing learning. Those likely to be effective include the following. Students can increase their effort, particularly when the effort leads to tackling more challenging tasks or appreciating higher quality experiences rather than just doing "more." We are more likely to increase effort when the intended goal "is clear, when high commitment is secured for it, and when belief in eventual success is high" (Kluger & DeNisi, 1996, p. 260). Students may also develop effective error detection skills, which lead to their own self-feedback aimed at reaching a goal. Such error detection can be very powerful, provided students have some modicum of knowledge and understanding about the task on which to strategize and regulate. In addition, students can seek better strategies to complete the task or be taught them, or they can obtain more information from which they can then solve problems or use their self-regulatory proficiencies.

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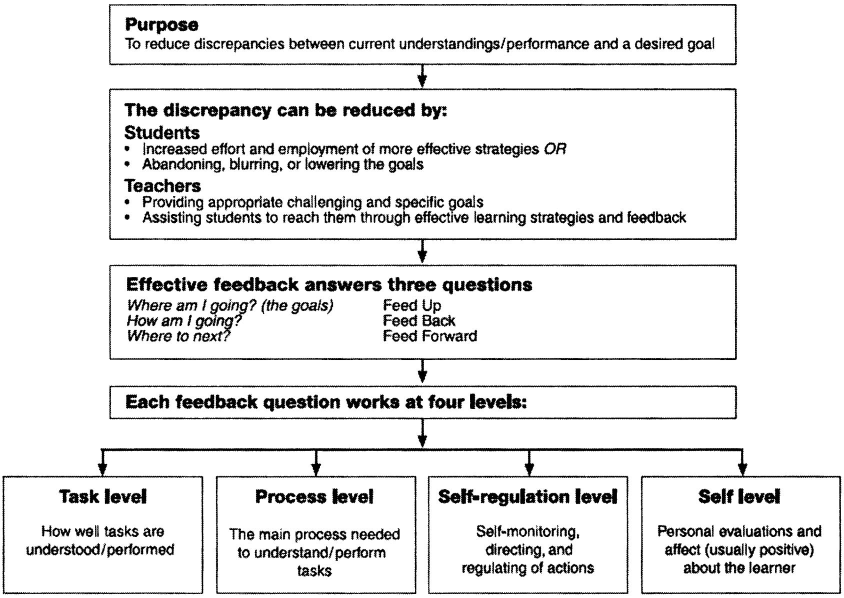

FIGURE 1. *A model of feedback to enhance learning.*

Some strategies to reduce the gap are less productive. Students may abandon goals and thus eliminate any gap, and this often leads to nonengagement in the pursuit of further goals (Bandura, 1982; Mikulincer, 1988; Steinberg, 1996). They may choose to blur the goals, combining them with so many others that after performing, they can pick and choose those goals they attained and ignore the others. Alternatively, students can change the standard by setting less challenging goals, accepting performance far below their capabilities as satisfactory.

There are also multiple ways teachers can assist in reducing the gap between actual performance and desired goal attainment. These include providing appropriate challenging and specific goals. Specific goals are more effective than general or nonspecific ones, primarily because they focus students' attention, and feedback can be more directed (Locke & Latham, 1984). The goals and associated feedback are also more likely to include information about the criteria for success in attaining them than more general goals.

Teachers can also assist by clarifying goals, enhancing commitment or increased effort to reaching them through feedback. Goals can also be made more manageable by narrowing the range of reasonable hypotheses (Sweller, 1990). More generally, teachers can create a learning environment in which students develop self-regulation and error detection skills (Hattie, Biggs, & Purdie, 1996). How feedback contributes to these processes depends largely on the focus of feedback and the level to which it is directed. In the next section, we develop a framework to assist in identifying the circumstances likely to result in the more productive outcomes.

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Addressing the Three Feedback Questions

Effective teaching not only involves imparting information and understandings to students (or providing constructive tasks, environments, and learning) but also involves assessing and evaluating students' understanding of this information, so that the next teaching act can be matched to the present understanding of the students. This "second part" is the feedback part, and it relates to the three major questions identified in Figure 1: Where am I going? How am I going? and Where to next? These three questions address the dimensions of feed up, feed back, and feed forward. An ideal learning environment or experience occurs when both teachers and students seek answers to each of these questions. Too often, teachers limit students' opportunities to receive information about their performance in relation to any of these questions by assuming that responsibility for the students and not considering the learning possibilities for themselves.

Where Am I Going?

A critical aspect of feedback is the information given to students and their teachers about the attainment of learning goals related to the task or performance. These goals can be wide ranging and include items such as singing a song, running a race, noting beauty in a painting, sanding a piece of wood, or riding a bicycle. Judging the success of goal attainment may occur on many dimensions. The judgments may be direct, such as "passing a test" or "completing an assignment"; comparative, such as "doing better than Mary" or "doing better than last time"; social, such as "not getting a detention" or "seeking teacher approval"; engagement related, such as "singing a song" or "running a race"; or automatic and triggered outside of specific awareness, such as "doing well on a task" or "seeking more challenging tasks." On this last type, Bargh, Gollwitzer, Lee-Chai, Barndollar, and Trotschel (2001) demonstrated that goals can promote goal-directed action (e.g., achievement or cooperation on tasks), produce persistence at task performance in the face of obstacles, and favor the resumption of disrupted tasks even in the presence of more attractive alternatives. As Black and Wiliam (1998) concluded, "the provision of challenging assignments and extensive feedback lead to greater student engagement and higher achievement" (p. 13)

Goals may relate to specific attainments or understandings or to differing qualities of experience, and they typically involve two dimensions: challenge and commitment. Challenging goals relate to feedback in two major ways. First, they inform individuals

> as to what type or level of performance is to be attained so that they can direct and evaluate their actions and efforts accordingly. Feedback allows them to set reasonable goals and to track their performance in relation to their goals so that adjustments in effort, direction, and even strategy can be made as needed. (Locke & Latham, 1990, p. 23)

These levels of attainment we have termed "success criteria," and goals without clarity as to when and how a student (and teacher) would know they were successful are often too vague to serve the purpose of enhancing learning. Second, feedback allows students (and/or their teachers) to set further appropriately challenging

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goals as the previous ones are attained, thus establishing the conditions for ongoing learning.

The relationship between feedback and goal-related challenge is complex. If feedback does not lead to reducing the discrepancy between current understandings and goals, students are likely to close the gap by overstating their current status or claiming various attributions that reduce effort and engagement. Feedback cannot lead to a reduction in this discrepancy if the goal is poorly defined, because the gap between current learning and intended learning is unlikely to be sufficiently clear for students to see a need to reduce it (Earley, Northcraft, Lee, & Lituchy, 1990; Erez, 1977; Frost & Mahoney, 1976). An additional problem occurs when feedback is not directed toward the attainment of a goal. Too often, the feedback given is unrelated to achieving success on critical dimensions of the goal. For example, students are given feedback on presentation, spelling, and quantity in writing when the criteria for success require, say, "creating mood in a story." Such feedback is not effective in reducing the gap relating to the intention of creating mood (Clarke, Timperley, & Hattie, 2003; Timperley & Parr, 2005).When goals have appropriate challenge and teachers and students are committed to these goals, a clearer understanding of the criteria for success is likely to be shared.

Goals are more effective when students share a commitment to attaining them, because they are more likely to seek and receive feedback (Locke & Latham, 1990). Teachers and parents often assume that students share a commitment to academic goals, whereas the reality is that developing this shared commitment needs to be nurtured and built. Commitment can be induced by authority figures; peer groups; competition; role models; public statements about intentions, incentives, and rewards; punishment; and general valence and instrumentality (e.g., Bandura, 1986; Carroll, Houghton, Durkin, & Hattie, 2001; Hollenbeck, Klein, O'Leary, & Wright, 1989; Latham & Lee, 1986; Lee, Locke, & Latham, 1989; Locke & Latham, 1984). For example, Earley and Kanfer (1985) showed that modeling can be effective by having participants watch a film of either a high-performing student or a low-performing student completing a class-scheduling task. Following this, students were assigned or encouraged to set difficult goals. Those who had observed the high-performing student in the video had significantly higher commitment levels than those who had observed the low-performing role model.

How Am I Going?

Answering this question involves a teacher (or peer, task, or self) providing information relative to a task or performance goal, often in relation to some expected standard, to prior performance, and/or to success or failure on a specific part of the task. This aspect of feedback could be termed the feed-back dimension. Feedback is effective when it consists of information about progress, and/or about how to proceed. Students often seek information about "how they are going," although they may not always welcome the answers. Too often, attention to this question leads to assessment or testing, whereas this is not the fundamental conception underlying this question. "Tests" are but one method used by teachers and students to address this question and, as discussed below, often fail to convey feedback information that helps teachers and their students to know how they are going.

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Where to Next?

Instruction often is sequential, with teachers providing information, tasks, or learning intentions; students attempting tasks; and some subsequent consequence. Too often, the consequence is more information, more tasks, and more expectations; students thus learn that the answer to "Where to next?" is "more." The power of feedback, however, can be used to specifically address this question by providing information that leads to greater possibilities for learning. These may include enhanced challenges, more self-regulation over the learning process, greater fluency and automaticity, more strategies and processes to work on the tasks, deeper understanding, and more information about what is and what is not understood. This feed-forward question can have some of the most powerful impacts on learning.

Integrating the Three Questions

Rather than the above three questions working in isolation at each of the four levels, they typically work together. Feedback relating to "How am I going?" has the power to lead to undertaking further tasks or "Where to next?" relative to a goal "Where am I going?" As Sadler (1989) convincingly argued, it is closing the gap between where students are and where they are aiming to be that leads to the power of feedback.

The Focus of Feedback: The Four Levels

The focus of feedback is critically important, and in this article, we claim that there are four major levels and that the level at which feedback is directed influences its effectiveness. First, feedback can be about a task or product, such as whether work is correct or incorrect. This level of feedback may include directions to acquire more, different, or correct information, such as "You need to include more about the Treaty of Versailles." Second, feedback can be aimed at the process used to create a product or complete a task. This kind of feedback is more directly aimed at the processing of information, or learning processes requiring understanding or completing the task. For example, a teacher or peer may say to a learner, "You need to edit this piece of writing by attending to the descriptors you have used so the reader is able to understand the nuances of your meaning," or "This page may make more sense if you use the strategies we talked about earlier." Third, feedback to students can be focused at the self-regulation level, including greater skill in self-evaluation or confidence to engage further on a task. For example, "You already know the key features of the opening of an argument. Check to see whether you have incorporated them in your first paragraph." Such feedback can have major influences on self-efficacy, self-regulatory proficiencies, and self-beliefs about students as learners, such that the students are encouraged or informed how to better and more effortlessly continue on the task. Fourth, feedback can be personal in the sense that it is directed to the "self," which, we argue below, is too often unrelated to performance on the task. Examples of such feedback include "You are a great student" and "That's an intelligent response, well done."

Thus, there is a distinction between feedback about the task (FT), about the processing of the task (FP), about self-regulation (FR), and about the self as a person (FS). We argue that FS is the least effective, FR and FP are powerful in terms of

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deep processing and mastery of tasks, and FT is powerful when the task information subsequently is useful for improving strategy processing or enhancing self-regulation (which it too rarely does).

Feedback About the Task

This level includes feedback about how well a task is being accomplished or performed, such as distinguishing correct from incorrect answers, acquiring more or different information, and building more surface knowledge. This type of feedback is most common and is often called corrective feedback or knowledge of results, and it can relate to correctness, neatness, behavior, or some other criterion related to task accomplishment. About 90% of teachers' questions (sometimes written but typically verbal) in classrooms are aimed at this information level (Airasian, 1997). Teachers commonly mix corrective feedback with information at the self level, which dilutes the power of the FT (e.g., "Good boy, that is correct"; see Bennett & Kell, 1989). By itself, corrective feedback can be powerful. From various meta-analyses, Lysakowski and Walberg (1982) reported an effect size of 1.13, Walberg (1982) reported 0.82, and Tenenbaum and Goldring (1989) reported 0.74, all of which are substantial effects. Having correct information is a pedestal on which the processing and self-regulation is effectively built.

FT is more powerful when it is about faulty interpretations, not lack of information. If students lack necessary knowledge, further instruction is more powerful than feedback information. One of the problems with feedback at the task level is that it often does not generalize to other tasks. Thompson (1998), for example, demonstrated that improvement was specific to the questions for which feedback was provided and was not used to answer other questions.

Feedback aimed to move students from task to processing and then from processing to regulation is most effective. Too much feedback within a level may even detract from performance. For example, FT that provides very specific information about the correctness of the minutiae of tasks and is not also directed to the processing required to complete the task can direct attention below the level necessary for high-level performance and thus interfere with task accomplishment (Kluger & DeNisi, 1996). In the case of a rotating a "turtle" in a LOGO simulation, Simmons and Cope (1993) found that when FT was too specific, the students were unable to build up an estimate of rotation by successive increments. When the immediate feedback specific to each performance was reduced, strategies were promoted that involved more of the problem elements representing higher level responses. Hence, too much feedback only at the task level may encourage students to focus on the immediate goal and not the strategies to attain the goal. It can lead to more trial-and-error strategies and less cognitive effort to develop informal hypotheses about the relationship between the instructions, the feedback, and the intended learning.

Winne and Butler (1994) argued that the benefits of FT depend heavily on learners' (a) being attentive to the varying importance of the feedback information during study of the task, (b) having accurate memories of those features when outcome feedback is provided at the task's conclusion, and (c) being sufficiently strategic to generate effective internal feedback about predictive validities (e.g., Which factors boost my performance?). It is likely that feedback at this task level is most beneficial when it helps students reject erroneous hypotheses and provides cues as to

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directions for searching and strategizing. Such cues can sensitize students to the competence or strategy information in a task or situation (Harackiewicz, 1979; Harackiewicz, Mabderlink, & Sansone, 1984).

Feedback relating specifically to the task can be conceived along a number of dimensions, such as high to low complexity, individual or group performance, and written or numeric notations. Simple more than complex task performance benefits from FT (Balzer, Doherty, & O'Connor, 1989). Similarly, simple rather than complex FT tends to be more effective. Kulhavy, White, Topp, Chan, and Adams (1985) provided students with reading passages and multiple-choice items with increasingly complex feedback provided. First they were given the correct answer, and then they discussed the four incorrect responses. Each sentence of the passage was subsequently read and used to explain why one of the error choices was incorrect, and finally the relevant section of the passage in which the correct answer was identified. The less complex feedback that provided the correct answer resulted in higher levels of subsequent task performance than the more complex versions of the feedback, for which the effect was small. It may be, the authors conjectured, that providing additional information about the incorrect responses actually increased the likelihood that the error was remembered by the learner. Alternatively, it may be that students processed extra feedback information at a more surface level, because they did not perceive it as being directly related to the issue of identifying a correct response. However, these results were mediated by the readers' confidence in their responses. Those with high response confidence, who had little trouble understanding or interacting with the material, were more likely to make efficient use of the feedback whatever its complexity.

Feedback, particularly at this task level, can be delivered and received in both individual and group situations. When delivered in groups, the feedback messages may be confounded by the perceptions of relevance to oneself or to other group members. For example, a student may interpret the feedback as pertaining to him or her or may interpret it as relating to the group as a whole or to other individuals in the group. In these latter two situations, it is likely either to be diluted or to be perceived as irrelevant to the individual student's performance (Nadler, 1979). The effectiveness of FT in these situations depends very much on students' commitment and involvement in the task and on their notions about whether it relates to their performance.

The effectiveness of marks or written comments has also been investigated. There is considerable evidence that providing written comments (specific FT) is more effective than providing grades (Black & Wiliam, 1998; Crooks, 1988). In one of the early and influential studies, Page (1958) found that feedback in the form of short written comments rather than grades alone significantly improved the test performance of students in 74 classrooms (see also Cardelle & Corno, 1981; Elawar & Corno, 1985; McLaughlin, 1974). R. Butler (1987) demonstrated that grades can increase involvement, but they do not affect performance (relative to a no-FT condition). She also showed (R. Butler, 1988) that feedback through comments alone led to learning gains, whereas marks alone or comments accompanied by marks or giving praise did not. She claimed that such results called in question the whole classroom culture of marks, grades, gold stars, merit awards, competition rather than personal improvement. As will become a theme later in this article, feedback that mixes FS with FT is less effective than FT by itself.

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Feedback About the Processing of the Task

FP is more specific to the processes underlying tasks or relating and extending tasks. Such feedback concerns information about relations in the environment, relations perceived by a person, and relations between the environment and the person's perceptions (Balzer et al., 1989). A surface understanding of learning involves the acquisition, storing, reproduction, and use of knowledge and thus relates more to FT. A deep understanding of learning involves the construction of meaning (understanding) and relates more to the relationships, cognitive processes, and transference to other more difficult or untried tasks (Marton, Dall'Alba, & Beaty, 1993; Purdie, Hattie, & Douglas, 1996; Säljö, 1979; Watkins & Regmi, 1992; Watkins, Regmi, & Astilla, 1991).

A major type of FP relates to students' strategies for error detection, thus providing oneself with feedback. Such errors may indicate failure and a need to restrategize, to choose different strategies, to be more effective in applying strategies, and/or to seek help. Whether students engage in error correction strategies following error detection depends on their motivation to continue to pursue the goal or to reduce the gap between current knowledge and the goal. Carver and Scheier (1981, 1982, 1990) argued that when a student encounters an impediment (such as detecting an error) while pursuing a goal, a reassessment of the situation is triggered. In considering their reassessments, students estimate how probable it is that they can achieve their goals if they invest further effort, modify their plans, or both.

Feedback information about the processes underlying a task also can act as a cueing mechanism and lead to more effective information search and use of task strategies. Cues are most useful when they assist students in rejecting erroneous hypotheses and provide direction for searching and strategizing (Earley, 1988; Harackiewicz, 1979; Harackiewicz et al., 1984; Wood & Bandura, 1987). This type of feedback is akin to D. L. Butler and Winne's (1995) notion of task validity feedback, which brings to a learner's attention "the relationship between a cue, such as the presence and use of an advance organizer, and the probability of successful performance" (p. 262).

Feedback at the process level appears to be more effective than at the task level for enhancing deeper learning (e.g., Balzer et al., 1989). Earley et al. (1990) claimed that "using process feedback with goal setting appears to be a direct and powerful way of shaping an individual's task strategy, and using outcome feedback is a much less efficient way of shaping strategy" (p. 103). It needs to be noted, however, that there can be a powerful interactive effect between feedback aimed at improving the strategies and processes and feedback aimed at the more surface task information. The latter can assist in improving task confidence and self-efficacy, which in turn provides resources for more effective and innovative information and strategy searching (Earley et al., 1990).

Feedback About Self-Regulation

Self-regulation involves an interplay between commitment, control, and confidence. It addresses the way students monitor, direct, and regulate actions toward the learning goal. It implies autonomy, self-control, self-direction, and self-discipline. Such regulation involves "self-generated thoughts, feelings, and actions

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that are planned and cyclically adapted to the attainment of personal goals" (Zimmerman, 2000, p. 14) and can lead to seeking, accepting, and accommodating feedback information.

There are at least six major aspects of FR that mediate the effectiveness of feedback, discussed in more detail below. By way of overview, these include the capability to create internal feedback and to self-assess, the willingness to invest effort into seeking and dealing with feedback information, the degree of confidence or certainty in the correctness of the response, the attributions about success or failure, and the level of proficiency at seeking help.

Effective learners create internal feedback and cognitive routines while they are engaged in academic tasks. D. L. Butler and Winne (1995) argued that for

> all self-regulated activities, feedback is an inherent catalyst. As learners monitor their engagement with tasks, internal feedback is generated by the monitoring process. That feedback describes the nature of outcomes and the qualities of the cognitive processes that led to those states. We hypothesize that more effective learners develop idiosyncratic cognitive routines for creating internal feedback while they are engaged with academic tasks. (p. 245)

Less effective learners have minimal self-regulation strategies, and they depend much more on external factors (such as the teacher or the task) for feedback. They rarely seek or incorporate feedback in ways that will enhance their future learning or self-regulation strategies.

Self-assessment is a self-regulatory proficiency that is powerful in selecting and interpreting information in ways that provide feedback. There are two major aspects of self-assessment: self-appraisal and self-management (Paris & Winograd, 1990). Self-appraisal relates to students' facility to review and evaluate their abilities, knowledge states, and cognitive strategies through a variety of self-monitoring processes. Self-management is the monitoring and regulating of students' ongoing behavior through planning, correcting mistakes, and using fix-up strategies. When students have the metacognitive skills of self-assessment, they can evaluate their levels of understanding, their effort and strategies used on tasks, their attributions and opinions of others about their performance, and their improvement in relation to their goals and expectations. They can also assess their performance relative to others' goals and the global aspects of their performance. As students become more experienced at self-assessment, multiple dimensions of performance can be assessed (Paris & Cunningham, 1996). Most important, students know how and when to seek and receive feedback from others.

Students' willingness to invest effort in seeking and dealing with feedback information relates to the transaction costs invoked at the self-regulatory level. These transaction costs include effort costs (the effort necessary for feedback search), face costs (the evaluative effects of others on the individual for seeking feedback), and inference costs (the implications of inferential errors resulting from inaccurately interpreting feedback; Ashford & Cummings, 1983; de Luque & Sommer, 2000). The benefit incurred to offset these costs is a reduction in the gap between current and desired or expected performance. It is the existence of evaluative uncertainty that makes seeking feedback worth incurring the related costs (Trope, 1975, 1980). When the cost/benefit ratio becomes prohibitive, however, people refrain from seeking feedback.

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Decisions about whether to seek feedback are not only governed by this cost/benefit ratio. In general, feedback is psychologically reassuring, and people like to obtain feedback about their performance even if it has no impact on their performance (Ashford & Cummings, 1983, p. 277). It is important, therefore, not to confuse feelings that feedback is desirable with the question of whether feedback benefits performance.

The degree of confidence that students have in the correctness of responses can affect receptivity to and seeking of feedback. Kulhavy and Stock (1989) noted that if confidence or response certainty is high and the response turns out to be a correct one, little attention is paid to the feedback. Feedback has its greatest effect when a learner expects a response to be correct and it turns out to be wrong. As Kulhavy and Stock noted, "high confidence errors are the point at which feedback should play its greatest corrective role, simply because the person studies the item longer in an attempt to correct the misconception" (p. 225). Conversely, if response certainty is low and the response turns out to be wrong, feedback is largely ignored. In these circumstances, low confidence places "a student in a position requiring associative strategies rather than the integration of new information into existing structures. Under this condition, feedback should have minimal effect regardless of whether or not the response is the correct one" (Kulhavy, 1977, p. 226). Further instruction and information are more effective than feedback in this situation.

Feelings of self-efficacy are important mediators in feedback situations. From their major review, Kluger and DeNisi (1996) concluded that feedback is effective to the degree to which it directs information to enhanced self-efficacy and to more effective self-regulation, such that attention is directed back to the task and causes students to invest more effort or commitment to the task. These authors claimed that such feedback is likely "to yield impressive gains in performance, possibly exceeding 1 sd" (p. 278).

Students' attributions about success or failure can often have more impact than the reality of that success or failure. There can be deleterious effects on feelings of self-efficacy and performance when students are unable to relate the feedback to the cause of their poor performance. Unclear evaluative feedback, which fails to clearly specify the grounds on which students have met with achievement success or otherwise, is likely to exacerbate negative outcomes, engender uncertain self-images, and lead to poor performance (Thompson, 1997, 1998, 1999; Thompson & Richardson, 2001). On the flip side, undeserved success feedback increases outcome uncertainty and can lead to increases in self-handicapping strategies (Smith, Snyder, & Handelsman, 1982). As Berglas and Jones (1978) claimed, self-handicapping stems from a capricious, chaotic feedback reinforcement history, suggesting that "it is not that their histories are pocketed with repeated failure; they have been amply rewarded, but in ways and on occasions that leave them deeply uncertain about what the reward was for" (p. 407).

There is considerable evidence that feedback that attributes performance to effort or ability increases engagement and performance on tasks (Craven, Marsh, & Debus, 1991; Dohrn & Bryan, 1994). The impact of feedback about effort or ability, however, may depend on circumstances. Schunk and Rice (1991), for example, highlighted the need to explore such feedback over extended periods, because students may respond differently to the feedback depending on the stage of task accomplishment. Effort feedback appears to be credible in the early stages

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of learning, when students need to expend effort to succeed. As skills develop, and success should require less effort, ability feedback may become more credible. Ability feedback, however, may detract from the learning focus of goals. Mueller and Dweck (1998), for example, conducted a series of six studies with elementary students and found that students provided with ability feedback were more performance than learning oriented and reported poorer performance and lower enjoyment of tasks after a failure.

Seeking help is a learner proficiency, and many types of help-seeking behavior can be considered aspects of self-regulation. A major distinction is made between instrumental help seeking (asking for hints rather than answers) and executive help seeking (asking for answers or direct help that avoids time or work; Nelson-Le Gall, 1981, 1985; Ryan & Pintrich, 1977). Higher levels of instrumental help seeking lead to feedback at the self-regulation levels, whereas executive help seeking is more likely to relate to the task level and sometimes the processing level. When considering how to develop instrumental help-seeking behavior, it is important to keep in mind it is mediated by emotional factors. Many students do not seek help because of perceived threats to self-esteem or social embarrassment (Karabenick & Knapp, 1991; Newman & Schwager, 1993).

Feedback About the Self as a Person

We include a final level of feedback not because it is effective but because it is often present in class situations and too often used instead of FT, FP, or FR (Bond, Smith, Baker, & Hattie, 2000). Personal feedback, such as "Good girl" or "Great effort," typically expresses positive (and sometimes negative) evaluations and affect about the student (Brophy, 1981). It usually contains little task-related information and is rarely converted into more engagement, commitment to the learning goals, enhanced self-efficacy, or understanding about the task. FS can have an impact on learning only if it leads to changes in students' effort, engagement, or feelings of efficacy in relation to the learning or to the strategies they use when attempting to understand tasks. The effects at the self level are too diluted, too often uninformative about performing the task, and too influenced by students' self-concept to be effective. The information has too little value to result in learning gains.

Praise addressed to students is unlikely to be effective, because it carries little information that provides answers to any of the three questions and too often deflects attention from the task. Various meta-analyses have demonstrated its ineffectiveness. Wilkinson (1981) completed a meta-analysis on teacher praise and concluded that it bears little, if any, relationship to student achievement (overall effect = 0.12). Kluger and DeNisi (1998) also reported a similarly low effect size for praise (0.09) and found that no praise has a greater impact on achievement (0.34).

It is important, however, to distinguish between praise that directs attention away from the task to the self (because such praise has low information value to achievement and learning) and praise directed to the effort, self-regulation, engagement, or processes relating to the task and its performance (e.g., "You're really great because you have diligently completed this task by applying this concept"). This latter type of praise can assist in enhancing self-efficacy and thus can be converted by students back into impact on the task, and hence the effects are

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much greater. It seems likely, from reading these meta-analyses, however, that reviewers do not always distinguish between praise as a reinforcer or reward (for which it has zero to limited effect on achievement) and praise accompanied by information about the processes or performance (which has more, but still limited, effect).

These concerns about praise are not the same as claiming that students do not like to be praised; they do. Sharp (1985) reported that 26% of the adolescent students in his sample preferred to be praised loudly and publicly when they achieved on an academic task, 64% preferred to be praised quietly and privately, and only 10% preferred teachers to say nothing at all. Burnett (2002) and Elwell and Tiberio (1994) reported a similar percentage among elementary students and found that students preferred praise for trying hard rather than for having high ability (especially when the praise was public) and for achievement rather than for behavior. On the other hand, praise delivered publicly by a teacher can be perceived as punishing by some students if delivered in the presence of a peer group that does not esteem school achievement as valuable (Brophy, 1981; Carroll et al., 2001; Carroll, Durkin, Hattie, & Houghton, 1997; White & Jones, 2000).

Praise may be counterproductive and have negative consequences on students' self-evaluations of their ability. Meyer, Bachman, Hempelmann, Ploger, and Spiller (1979) and Meyer (1982) conducted a series of studies related to this issue. These authors demonstrated that older students perceived praise after success or neutral feedback after failure as an indication that the teacher perceived their ability to be low. When given criticism after failure and neutral feedback after success, they perceived that the teacher had estimated their ability to be high and their effort low. The same effects were not evident for younger students, however, who perceived praise after success as an indication of high ability and criticism after failure as a sign of low ability.

Part of the reason for the unpredictability of praise is that students often adopt reputational lenses to seek or evaluate feedback information aimed at the self level (e.g., "I want to be seen as a good student," "I do not want to be seen as a good student"). Students do a lot of "in the head" comparisons (Goethals, Messick, & Allison, 1991), and it is likely that such comparisons are selected, interpreted, and/or biased. Strengths and positive performances are seen as unique and self-created, whereas weakness and negative performances are seen as common in others and possibly caused by others (Campbell, 1986; Goethals, 1986; Klein, 2001; Suls & Wan, 1987). Such reputational lenses and biases, unless they lead to more investment in the task or to the use of better strategies to accomplish the task, are of low effectiveness (Carroll et al., 2001).

One of the difficulties with these in-the-head comparisons occurs because they are rarely tied to specific tasks but rather tend to be more generalized at the self level, and thus they can be difficult for teachers to change (Craven, 1997; Hattie, 1992), although they help explain why feedback directed at the self level is usually dissipated and ineffective in increasing engagement or understanding of tasks. Typically, these strategies have a negative effect on learning (Hattie & Marsh, 1995) because they include or lead to self-handicapping, learned hopelessness, or social comparison. The related feedback itself is usually discounted or dismissed, and goals of low challenge are adopted.

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Using the Four Levels and Three Questions to Untangle Some Thorny Feedback Issues

The model presented in Figure 1 is used to address four commonly debated issues about feedback: the timing of feedback, the effects of positive and negative feedback, the optimal classroom use of feedback, and the role of assessment in feedback.

The Timing of Feedback

There has been much research on the timing of feedback, particularly contrasting immediate and delayed feedback. Most of this research has been accomplished without recognition of the various feedback levels. For example, immediate error correction during task acquisition (FT) can result in faster rates of acquisition, whereas immediate error correction during fluency building can detract from the learning of automaticity and the associated strategies of learning (FP). Similarly, in their meta-analysis of 53 studies, Kulik and Kulik (1988) reported that at the task level (i.e., testing situations), some delay is beneficial (0.36), but at the process level (i.e., engaging in processing classroom activities), immediate feedback is beneficial (0.28) (see also Bangert-Drowns, Kulik, Kulik, & Morgan, 1991; Brackbill, Blobitt, Davlin, & Wagner, 1963; Schroth & Lund, 1993; Sturges, 1972, 1978; Swindell & Walls, 1993).

Another example demonstrating that the effects of immediate feedback are likely to be more powerful for FT and delayed feedback more powerful for FP was provided by Clariana, Wagner, and Roher Murphy (2000). They found that the effectiveness of delayed compared with immediate feedback varied as a function of the difficulty of items in their test of information taught in a series of lessons. The effect sizes from delayed feedback were –0.06 for easy items, 0.35 for midrange items, and 1.17 for difficult items. These authors suggested that difficult items are more likely to involve greater degrees of processing about the task, and delayed feedback provides the opportunity to do this, whereas easy items do not require this processing and so delay is both unnecessary and undesirable.

The Effects of Positive and Negative Feedback

Kluger and DeNisi (1996) noted that both positive and negative feedback can have beneficial effects on learning, and the argument presented in this article is that the untangling of these effects depends more on the level at which the feedback is aimed and processed than on whether it is positive or negative. Specifically, negative feedback is more powerful at the self level, and both types can be effective as FT, but there are differential effects relating to commitment, mastery or performance orientation, and self-efficacy at the FR level.

At the self level (FS), it has already been noted that no praise is more effective than praise if accompanied by FT. Furthermore, there is much evidence to suggest that negative feedback or disconfirmation can be more potent than positive feedback or confirmation at this self level (Brockner, 1979; Brunit, Huguet, & Monteil, 2000; Campbell & Fairey, 1985; Hattie, 1992; Janoff-Bulman & Brickman, 1982; Kinch, 1963, 1968; Okun & Sasfy, 1977; Shrauger & Sorman, 1977). Swann (1985) and Swann and Hill (1982) found that individuals will go to great lengths to confirm their self-perceptions by attending most closely to feedback information that

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fits their view of the self and by trying to arrange their environment to acquire further self-confirming evidence. Individuals also tend to reject or ignore negative accounts of their behavior that differ from their own (Greenwald, 1980; Markus, 1977; Tesser & Campbell, 1983) or invoke an external frame of reference (Marsh, 1987, 1990).

At the self-regulation level, the commitment to goals is a major mediator of the effectiveness of positive and negative feedback. Van-Dijk and Kluger (2000, 2001) demonstrated that positive feedback increases motivation relative to negative feedback for a task that people "want to do" and decreases motivation relative to negative feedback for a task that people "have to do." Thus, when we are committed to a goal, we are more likely to learn as a function of positive feedback, but when we undertake a task that we are not committed to (and hence have to do), we are more likely to learn as a function of negative feedback (we need to be driven, in the older motivation terminology). It is likely, however, that this effect is short lived in that it may lead to future task avoidance behavior.

In circumstances in which students are committed to the goals, feedback can trigger

> an internal comparison process, which determines how individuals react to feedback. Upon receiving negative feedback, individuals become more dissatisfied with their previous performance level, set higher performance goals for their future performance, and perform at a higher level than those who receive positive feedback or no feedback at all. (Podsakoff & Farh, 1989, p. 62)

Positive feedback, however, can increase the likelihood that students will return to or persist in an activity and self-report higher interest in the activity (Deci et al., 1999).

There is also an interaction effect at this FR level between positive and negative feedback and the self-efficacy of students. Swann, Pelham, and Chidester (1988) found that for highly self-efficacious students, feedback about initial success may signify a talent or potential ability, which leads to better coping in the face of disconfirmation feedback. They related the feedback to positive verifications of themselves as learners. As a consequence of disconfirmation feedback, highly self-efficacious people make more optimistic predictions about their performance after initial failure than after initial success, and they seek specifically unfavorable feedback to excel at the tasks.

For the low self-efficacious students, positive feedback about initial success may confirm that they have deficiencies that need to be remedied, which can lead to a variety of reactions. One reaction may be further engagement to remedy these "deficiencies" to reach a passable level of performance, which would afford protection against failure. Alternatively, these students may avoid tasks and feedback following initial success, because such success signifies that they have already reached an adequate level of performance, and further tests merely run the risk of disconfirming the (sometimes hard gained) favorable outcome.

Disconfirmatory feedback can also have a negative impact on subsequent motivation and performance for low self-efficacious students (Brockner, Derr, & Laing, 1987; Moreland & Sweeney, 1984). Kernis, Brockner, and Frankel (1989) argued that low self-efficacious people are more likely to react to negative feedback by

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experiencing negative affect, exhibiting less motivation on a subsequent task, and attributing the feedback less to effort and more to ability.

At the task level (FT), it has already been noted how powerful corrective feedback is for enhancing learning, particularly when learning new skills or tasks. Disconfirmation with corrective information can be effective, but disconfirmation without this information is of little use because it provides no information regarding what to do or how to respond next time (Breakwell, 1983; Weiner, 1974a, 1974b, 1977). It is acknowledged that FT can be ignored by students if it is poorly presented or if the students' knowledge is insufficient to accommodate additional feedback information. Howie, Sy, Ford, and Vicente (2000) found that it was the poor presentation (or lack of information value in the feedback) rather than students' faulty knowledge that more often explained the low power of some feedback information.

Feedback and Classrooms

This feedback model highlights the demands on teachers if they are to teach effectively. First, they need to undertake effective instruction. To reiterate, feedback is what happens second, and to make the feedback effective, teachers need to make appropriate judgments about when, how, and at what level to provide appropriate feedback and to which of the three questions it should be addressed.

It is difficult to document the frequency of feedback in classrooms, except to note that it is low. Bond et al. (2000) intensively documented the daily life of 65 teachers (half who had passed national board certification and half who had not). Although feedback was one of the variables that most discriminated between those who did and did not pass certification as "accomplished" teachers, the frequency of FT was low in the classrooms of both groups (the most common form of feedback was praise).

When feedback is given, it is likely to be self related (FS) or at best corrective task related (FT) and to be influenced by perceptions of students' need. Teachers give "poor" students more praise (FS), and the little FR provided is typically negative (Blote, 1995). Teacher feedback to boys is more related to a lack of effort or poor behavior, and feedback to girls is more about ability attributions (Dweck, Davidson, Nelson, & Enna, 1978).

Feedback is not only differentially given but also differentially received (Diehl & Sterman, 1995; Paich & Sterman, 1993; Sterman, 1989). De Luque and Sommer (2000) found that students from collectivist cultures (e.g., Confucian-based Asia, South Pacific nations) preferred indirect and implicit feedback, more group-focused feedback, and no self-level feedback. Students from individualist cultures (e.g., the United States) preferred more direct feedback particularly related to effort, were more likely to use direct inquiry to seek feedback, and preferred more individual focused self-related feedback.

The climate of the classroom is critical, particularly if disconfirmation and corrective feedback at any level is to be welcomed and used by the students (and teachers). Errors and disconfirmation are most powerful in climates in which they are seen as leading to future learning, particularly relating to processing and regulation. Student engagement in learning is likely to be constrained by the evaluative dimensions of classroom lessons because there is personal risk involved in responding publicly and failing. Too often, the level of risk is determined by the

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likelihood that a student can supply an answer and by the accountability climate set up by the teacher and other students (Alton-Lee & Nuthall, 1990, 1998; Doyle, 1983). Typically, students respond only when they are fairly sure that they can respond correctly, which often indicates they have already learned the answer to the question being asked. Errors, and learning from them, are rarely welcomed.

Simply providing more feedback is not the answer, because it is necessary to consider the nature of the feedback, the timing, and how a student "receives" this feedback (or, better, actively seeks the feedback). As already noted, students can bias and select feedback information. The ways and manner in which individuals interpret feedback information is the key to developing positive and valuable concepts of self-efficacy about learning, which in turns leads to further learning. Teachers need to view feedback from the perspective of the individuals engaged in the learning and become proactive in providing information addressing the three feedback questions and developing ways for students to ask these questions of themselves. Students, too often, view feedback as the responsibility of someone else, usually teachers, whose job it is to provide feedback information by deciding for the students how well they are going, what the goals are, and what to do next.

Feedback and Assessment

There are major implications from this review of feedback for assessment in the classroom. Assessment can be considered to be activities that provide teachers and/or students with feedback information relating to one or more of the three feedback questions (at the FT, FP, or FR level). Such a definition places emphasis on devising assessment tasks that provide information and interpretations about the discrepancy between current status and the learning goals at any of the three levels: about tasks, about the processes or strategies to understand the tasks, and about the regulation, engagement, and confidence to become more committed to learn. This contrasts with the more usual definition of assessment, an activity used to assess students' levels of proficiency. This usual definition places more emphasis on the adequacy of scores (and less on the interpretation of these scores). Crooks (1988) and Black and Wiliam (1998) demonstrated there is little evidence that such classroom testing has assisted in the learning process. Black and Wiliam, for example, reviewed 578 publications relating to the role of assessment in learning and concluded that classroom assessment

> typically encourages superficial and rote learning, concentrating on recall of isolated details, usually items of knowledge which pupils soon forget... teachers do not generally review the assessment questions that they use and do not discuss them critically with peers, so there is little reflection on what is being assessed. (p. 17)

Too often, the power of assessment feedback is aimed to "drive" students toward (often unspecified) goals or to "do more" or "do better." Students receive little feedback information in these instances, primarily because the assessment feedback does not address the three major questions, and rarely does such feedback enhance the processes (FP) and metacognitive attributes (FR) of the task. Furthermore, teachers too often see assessment feedback as making statements about students, not about their teaching (Timperley & Wiseman, 2002). Thus, the benefits of feedback in the classroom from such testing are often diluted.

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There are many ways in which teachers can deliver feedback to students and for students to receive feedback from teachers, peers, and other sources. The implication is not that we should automatically use more tests (Bangert-Drowns, Kulik, & Kulik, 1991). Rather, for students, it means gaining information about how and what they understand and misunderstand, finding directions and strategies that they must take to improve, and seeking assistance to understand the goals of the learning. For teachers, it means devising activities and questions that provide feedback to them about the effectiveness of their teaching, particularly so they know what to do next. Assessments can perform all these feedback functions, but too often, they are devoid of effective feedback to students or to teachers.

Conclusions

Feedback is information provided by an agent (e.g., teacher, peer, book, parent, experience) regarding aspects of one's performance or understanding. It occurs typically after instruction that seeks to provide knowledge and skills or to develop particular attitudes. The model proposed in this article identifies three major feedback questions: Where am I going? How am I going? and Where to next? The answers to these questions enhance learning when there is a discrepancy between what is understood and what is aimed to be understood. It can increase effort, motivation, or engagement to reduce this discrepancy, and/or it can increase cue searching and task processes that lead to understanding (thus reducing this discrepancy). Feedback is among the most critical influences on student learning. A major aim of the educative process is to assist in identifying these gaps ("How am I going?" relative to "Where am I going?") and to provide remediation in the form of alternative or other steps ("Where to next?").

The model discriminates between four levels of feedback: the task, the processing, the regulatory, and the self levels. Effective feedback at the task, process, and self-regulatory levels is interrelated. FT is more powerful when it results from faulty interpretations, not a lack of understanding. It is most effective when it aids in building cues and information regarding erroneous hypothesis and ideas and then leads to the development of more effective and efficient strategies for processing and understanding the material. Feedback at the process level is most beneficial when it helps students reject erroneous hypotheses and provides cues to directions for searching and strategizing. Such cues sensitize students to the competence or strategy information in a task or situation. Ideally, it moves from the task to the processes or understandings necessary to learn the task to regulation about continuing beyond the task to more challenging tasks and goals. This process results in higher confidence and greater investment of effort. This flow typically occurs as students gain greater fluency and mastery. Feedback that attends to self-regulation is powerful to the degree that it leads to further engagement with or investing further effort into the task, to enhanced self-efficacy, and to attributions that the feedback is deserved and earned. When feedback draws attention to the regulatory processes needed to engage with a task, learners' beliefs about the importance of effort and their conceptions of learning can be important moderators in the learning process.

Feedback at the self or personal level (usually praise), on the other hand, is rarely effective. Praise is rarely directed at addressing the three feedback questions and so is ineffective in enhancing learning. When feedback draws attention to the

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self, students try to avoid the risks involved in tackling challenging assignments, to minimize effort, and have a high fear of failure (Black & Wiliam, 1998) to minimize the risk to the self.

The three feedback questions are certainly not linearly interpreted or implemented, and the boundaries between them are fuzzy. Although it is important to know about goals, learning experiences do not necessarily begin by asking "What are the goals?" because these can be discovered (usually in more specific ways) as we undertake particular tasks. Goals can be many and sometimes competing, and much of the learning that accrues can lead to creating options to achieve the goals, weighing the pros and cons of options, considering the likelihood that a given course of action will lead to the goals, and learning about and evaluating the consequences of achieving the goals. Thus, goals may be constantly at issue, and the feedback about "How am I going?" can help in these evolving goal-related considerations. Similarly, the answer to "Where to next?" may be nowhere, if the goal is unchanging, the "outcome" is further engagement with the same or similar tasks, or the student believes that the answer is "wherever the teacher tells me to go." Such reactions typically indicate low self-regulation or overly dominant classroom regimes. The answer to "Where to next?" needs to be more directed to the refinement and seeking of more challenging goals, because these have the highest likelihood of leading to greater achievement.

It should be clear that providing and receiving feedback requires much skill by students and teachers. The model advanced in this article does not merely invoke a stimulus-and-response routine but requires high proficiency in developing a classroom climate, the ability to deal with the complexities of multiple judgments, and deep understandings of the subject matter to be ready to provide feedback about tasks or the relationships between ideas, willingness to encourage self-regulation, and having exquisite timing to provide feedback before frustration takes over. To be able to devote time and thoughts to feedback is aided when teachers automate many other tasks in the classroom and provide rich learning opportunities for all students and thus have the time and resources to be responsive to feedback (Hattie & Jaeger, 1998).

The model firmly identifies that feedback involves both the giving and receiving (by teachers and/or by students), and there can be gulfs between these. Students construct their worlds of learning and classrooms, and it is a major argument of this article that it is crucial for teachers to understand and appreciate that providing feedback is only a part of the equation. Similarly, some tasks more than others can lead to more effective feedback by teachers, students, or both. Learning can be enhanced to the degree that students share the challenging goals of learning, adopt self-assessment and evaluation strategies, and develop error detection procedures and heightened self-efficacy to tackle more challenging tasks leading to mastery and understanding of lessons. Students' self strategies and help seeking can mediate whether these effects occur. Students who wish to confirm positive self-belief rather than focus on learning goals are more likely to adopt or seek feedback that maximizes positive self-evaluations and/or minimizes negative self-evaluations. A number of self strategies were identified that inhibit the effects of feedback on learning, and it is only when students are grounded in and committed to the goals of learning and when the feedback is related to accomplishments of the learning that feedback is effective (Crocker & Wolfe, 2001). A major task for teachers and

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parents is to make academic goals salient for all students, because students who are prepared to question or reflect on what they know and understand are more likely to seek confirmatory and/or disconfirmatory feedback that allows for the best opportunities for learning.

Feedback, however, is not "the answer"; rather, it is but one powerful answer. With inefficient learners, it is better for a teacher to provide elaborations through instruction than to provide feedback on poorly understood concepts. If feedback is directed at the right level, it can assist students to comprehend, engage, or develop effective strategies to process the information intended to be learned. To be effective, feedback needs to be clear, purposeful, meaningful, and compatible with students' prior knowledge and to provide logical connections. It also needs to prompt active information processing on the part of learners, have low task complexity, relate to specific and clear goals, and provide little threat to the person at the self level. The major discriminator is whether it is clearly directed to the task, processes, and/or regulation and not to the self level. These conditions highlight the importance of classroom climates that foster peer and self-assessment and allow for learning from mistakes.

There are major implications for the design of assessments. Too often, assessments are used to provide snapshots of learning rather than providing information that can be used by students or their teachers to address the three feedback questions. Certainly, a critical conclusion is that teachers need to seek and learn from feedback (such as from students' responses to tests) as much as do students, and only when assessment provides such learning is it of value to either. Most current assessments provide minimal feedback, too often because they rely on recall and are used as external accountability thermometers rather than as feedback devices that are integral to the teaching and learning process. It is the feedback information and interpretations from assessments, not the numbers or grades, that matter. In too many cases, testing is used as the measure to judge whether change has occurred rather than as a mechanism to further enhance and consolidate learning by teachers or students. The costs of these thermometer-related accountability tests are high, and the feedback returns are minimal (Shepard et al., 1996).

On the other hand, when feedback is combined with effective instruction in classrooms, it can be very powerful in enhancing learning. As Kluger and DeNisi (1996) noted, a feedback intervention provided for a familiar task, containing cues that support learning, attracting attention to feedback-standard discrepancies at the task level, and void of cues that direct attention to the self is likely to yield impressive gains in students' performance. It is important to note, however, that under particular circumstances, instruction is more effective than feedback. Feedback can only build on something; it is of little use when there is no initial learning or surface information. Feedback is what happens second, is one of the most powerful influences on learning, too rarely occurs, and needs to be more fully researched by qualitatively and quantitatively investigating how feedback works in the classroom and learning process.

References

Airasian, P. W. (1997). *Classroom assessment* (3rd ed.). New York: McGraw-Hill.

Alton-Lee, A., & Nuthall, G. (1990). Research on teaching and learning: Thirty years of change. *Elementary School Journal, 90*(5), 547–570.

This content downloaded from
130.237.165.40 on Wed, 14 Jan 2026 09:55:34 UTC
All use subject to https://about.jstor.org/terms

Alton-Lee, A., & Nuthall, G. (1998). *Inclusive instructional design: Theoretical principles emerging from the Understanding Learning and Teaching Project* (Report to the Ministry of Education, Understanding Learning and Teaching Project 3). Wellington, New Zealand: Ministry of Education, Research Division.

Ashford, S. J., & Cummings, L. L. (1983). Feedback as an individual resource: Personal strategies of creating information. *Organizational Behavior and Human Performance, 32,* 370–398.

Balzer, W. K., Doherty, M. E., & O'Connor, R., Jr. (1989). Effects of cognitive feedback on performance. *Psychological Bulletin, 106*(3), 410–433.

Bandura, A. (1982). Self efficacy mechanism in human agency. *American Psychologist, 37,* 122–147.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice Hall.

Bangert-Drowns, R. L., Kulik, J. A., & Kulik, C. C. (1991). Effects of frequent classroom testing. *Journal of Educational Research, 85*(2), 89–99.

Bangert-Drowns, R. L., Kulik, C. L., Kulik, J. A., & Morgan, M. T. (1991). The instructional effect of feedback in test-like events. *Review of Educational Research, 61,* 213–237.

Bargh, J. A., Gollwitzer, P. M., Lee-Chai, A., Barndollar, K., & Trotschel, R. (2001). The automated will: Nonconscious activation and pursuit of behavioral goals. *Journal of Personality and Social Psychology, 81*(6), 1014–1027.

Bennett, N., & Kell, J. (1989). *A good start? Four year olds in infant schools.* Oxford, UK: Blackwell.

Berglas, S., & Jones, E. (1978). Drug choice as a self-handicapping strategy in response to noncontingent success. *Journal of Personality and Social Psychology, 36,* 405–417.

Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education, 5*(1), 7–75.

Blote, A. W. (1995). Students' self-concept in relation to perceived differential teacher treatment. *Learning & Instruction, 5*(3), 221–236.

Bond, L., Smith, R., Baker, W. K., & Hattie, J. A. (2000) *Certification system of the National Board for Professional Teaching Standards: A construct and consequential validity study.* Washington, DC: National Board for Professional Teaching Standards.

Brackbill, Y., Blobitt, W. E., Davlin, D., & Wagner, J. E. (1963). Amplitude of response and the delay-retention effect. *Journal of Experimental Psychology, 66*(1), 57–64.

Breakwell, G. M. (1983). Formulations and searchers. In G. M. Breakwell (Ed.), *Threatened identities* (pp. 3–26). Chichester, UK: Wiley.

Brockner, J. (1979). The effects of self-esteem, success-failure, and self-consciousness on task performance. *Journal of Personality and Social Psychology, 37,* 1732–1741.

Brockner, J., Derr, W. R., & Laing, W. N. (1987). Self-esteem and reactions to negative feedback: Towards greater generalizability. *Journal of Research in Personality, 21,* 318–334.

Brophy, J. (1981). Teacher praise: A functional analysis. *Review of Educational Research, 51,* 5–32.

Brunit, S., Huguet, P., & Monteil, J. M. (2000). Performance feedback and self-focused attention in the classroom: When past and present interact. *Social Psychology of Education, 3,* 277–293.

Burnett, P. C. (2002). Teacher praise and feedback and students' perceptions of the classroom environment. *Educational Psychology, 22*(1), 1–16.

This content downloaded from
130.237.165.40 on Wed, 14 Jan 2026 09:55:34 UTC
All use subject to https://about.jstor.org/terms

Butler, D. L., & Winne, P. H. (1995). Feedback and self-regulated learning: A theoretical synthesis. *Review of Educational Research, 65*(3), 245–274.

Butler, R. (1987). Task-involving and ego-involving properties of evaluation: Effects of different feedback conditions on motivational perceptions, interest and performance. *Journal of Educational Psychology, 79*, 474–482.

Butler, R. (1988). Enhancing and undermining intrinsic motivation: The effects of task-involving and ego-involving evaluation on interest and performance. *British Journal of Educational Psychology, 58*, 1–14.

Campbell, J. D. (1986). Similarity and uniqueness: The effects of attribute type, relevance, and individual differences in self-esteem and depression. *Journal of Personality and Social Psychology, 50*, 281–294.

Campbell, J. D., & Fairey, P. J. (1985). Effects of self-esteem, hypothetical explanations, and verbalization of expectancies on future performance. *Journal of Personality and Social Psychology, 48*, 1097–1111.

Cardelle, M., & Corno, L. (1981). Effects on second language learning of variations in written feedback on homework assignments. *TESOL Quarterly, 15*(3), 251–261.

Carroll, A., Durkin, K., Hattie, J., & Houghton, S. (1997). Goal setting among adolescents: A comparison of delinquent, at-risk, and not at-risk youth. *Journal of Educational Psychology, 89*, 441–450.

Carroll, A., Houghton, S., Durkin, K., & Hattie, J. (2001). *Reputation enhancing goals: Integrating reputation enhancement and goal setting theory as an explanation of delinquent involvement.* In F. Columbus (Ed.), Advances in psychology research (Vol. 4, pp. 101–129). New York: Nova Science.

Carver, C. S., & Scheier, M. F. (1981). *Attention and self regulation: A control theory to human behavior*. New York: Springer-Verlag.

Carver, C. S., & Scheier, M. F. (1982). Control theory: A useful conceptual framework for personality-social, clinical, and health psychology. *Psychological Bulletin, 92*, 111–135.

Carver, C. S., & Scheier, M. F. (1990). Origins and function of positive and negative affect: A control-process view. *Psychological Review, 97*, 19–35.

Clariana, R. B., Wagner, D., & Roher Murphy, L. C. (2000). Applying a connectionist description of feedback timing. *Educational Technology Research and Development, 48*(3), 5–21.

Clarke, S., Timperley, H., & Hattie, J. A. (2003). *Assessing formative assessment.* Auckland, New Zealand: Hodder Moa Beckett.

Craven, R. G. (1997). Enhancing academic self-concept: A large-scale longitudinal study in an educational setting. *Dissertation Abstracts International, A (Humanities and Social Sciences)*, 58(5–A), 1577.

Craven, R. G., Marsh, H. W., & Debus, R. L. (1991). Effects of internally focused feedback and attributional feedback on enhancement of academic self-concept. *Journal of Educational Psychology, 83*, 17–27.

Crocker, J., & Wolfe, C. T. (2001). Contingencies of self-worth. *Psychological Review, 108*(3), 593–623.

Crooks, T. J. (1988). The impact of classroom evaluation on students. *Review of Educational Research, 5*, 438–481.

Deci, E. L., Koestner, R., & Ryan, M. R. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin, 125*, 627–668.

Deci, E. L., & Ryan, R. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.

This content downloaded from
130.237.165.40 on Wed, 14 Jan 2026 09:55:34 UTC
All use subject to https://about.jstor.org/terms

de Luque, M. F., & Sommer, S. M. (2000). The impact of culture on feed-back-seeking behavior: An integrated model and propositions. *Academy of Management Review, 25*(4), 829–849.

Diehl, E., & Sterman, J. D. (1995). Effects of feedback complexity on dynamic decision making. *Organizational Behavior and Human Decision Processes, 62*, 198–215.

Dohrn, E., & Bryan, T. (1994). Attribution instruction. *Teaching Exceptional Children, 26*(4), 61–63.

Doyle, W. (1983). Academic work. *Review of Educational Research, 53*, 159–199.

Dweck, C. S., Davidson, W., Nelson, S., & Enna, B. (1978). Sex differences in learned helplessness: II. The contingencies of evaluative feedback in the classroom and III. An experimental analysis. *Developmental Psychology, 14*(3), 268–276.

Earley, P. C. (1988). Computer-generated performance feedback in the magazine-subscription industry. *Organizational Behavior and Human Decision Processes, 41*, 50–64.

Earley, P. C., & Kanfer, R. (1985). The influence of component participation and role models on goal acceptance, goal satisfaction, and performance. *Organizational Behavior & Human Decision Processes, 36*(3), 378–390.

Earley, P. C., Northcraft, G. B., Lee, C., & Lituchy, T. R. (1990). Impact of process and outcome feedback on the relation of goal setting to task performance. *Academy of Management Journal, 33*(1), 87–105.

Elawar, M. C., & Corno, L. (1985). A factorial experiment in teachers' written feedback on student homework: Changing teacher behaviour a little rather than a lot. *Journal of Educational Psychology, 77*, 162–173.

Elwell, W. C., & Tiberio, J. (1994). Teacher praise: What students want. *Journal of Instructional Psychology, 21*(4), 322–328.

Erez, M. (1977). Feedback: A necessary condition for the goal setting-performance relationship. *Journal of Applied Psychology, 62*, 624–627.

Frost, P. J., & Mahoney, T. A. (1976). Goal setting and the task process: An interactive influence on individual performance. *Organizational Behavior and Human Performance, 16*, 250–279.

Getsie, R. L., Langer, P., & Glass, G. V. (1985). Meta-analysis of the effects of type and combination of feedback on children's discrimination learning. *Review of Educational Research, 55*(1), 9–22.

Goethals, G. R. (1986). Fabricating and ignoring social reality: Self-serving estimates of consensus. In J. M. Olson, C. P. Hermann, & M. P. Zanna (Eds.), *Relative deprivation and social comparison: The Ontario Symposium* (Vol. 4, pp. 135–157). Hillsdale, NJ: Lawrence Erlbaum.

Goethals, G. R., Messick, D. M., & Allison, S. T. (1991). The uniqueness bias: Studies of constructive social comparison. In J. Suls & T. A. Wills (Eds.), *Social comparison research: Contemporary theory and research* (pp. 149–176). Hillsdale, NJ: Lawrence Erlbaum.

Greenwald, A. G. (1980). The totalitarian ego: Fabrication and revision of personal history. *American Psychologist, 35*, 603–618.

Harackiewicz, J. M. (1979). The effects of reward contingency and performance feedback on intrinsic motivation. *Journal of Personality & Social Psychology, 37*(8), 1352–1363.

Harackiewicz, J. M., Mabderlink, G., & Sansone, C. (1984). Rewarding pinball wizardry: effects of evaluation and cue value on intrinsic interest. *Journal of Personality and Social Psychology, 47*, 287–300.

This content downloaded from
130.237.165.40 on Wed, 14 Jan 2026 09:55:34 UTC
All use subject to https://about.jstor.org/terms

Hattie, J., & Jaeger, R. (1998). Assessment and classroom learning: A deductive approach. *Assessment in Education*, *5*(1), 111–122.

Hattie, J. A. (1992). *Self-concept*. Hillsdale, NJ: Lawrence Erlbaum.

Hattie, J. A. (1999, June.). *Influences on student learning* (Inaugural professorial address, University of Auckland, New Zealand). Retrieved from http://www.arts.auckland.ac.nz/staff/index.cfm?P=8650

Hattie, J. A., Biggs, J., & Purdie, N. (1996). Effects of learning skills intervention on student learning: A meta-analysis. *Review of Research in Education*, *66*, 99–136.

Hattie, J. A., & Marsh, H. W. (1995). Future research in self-concept. In B. Bracken (Ed.), *Handbook on self-concept* (pp. 421–463). Hillsdale, NJ: Lawrence Erlbaum.

Hollenbeck, J. R., Klein, H. J., O'Leary, A. M., & Wright, P. M. (1989). Investigation of the construct validity of a self-report measure of goal commitment. *Journal of Applied Psychology*, *74*, 951–956.

Howie, E., Sy, S., Ford, L., & Vicente, K. J. (2000). Human-computer interface design can reduce misperceptions of feedback. *System Dynamics Review*, *16*(3), 151–171.

Janoff-Bulman, R., & Brickman, P. (1982). Expectations and what people learn from failure. In N. T. Feather (Ed.), *Expectations and actions* (pp. 207–237). Hillsdale, NJ: Lawrence Erlbaum.

Karabenick, S. A., & Knapp, J. R. (1991). Relationship of academic help seeking to the use of learning strategies and other instrumental achievement behavior in college students. *Journal of Educational Psychology*, *83*, 221–230.

Kernis, M. H., Brockner, J., & Frankel, B. S. (1989). Self-esteem and reactions to failure: The mediating role of overgeneralization. *Journal of Personality and Social Psychology*, *57*, 707–714.

Kinch, J. W. (1963). A formalized theory of the self-image. *American Journal of Sociology*, *68*, 481–486.

Kinch, J. W. (1968). Experiments on factors related to self-concept change. *Journal of Social Psychology*, *74*, 251–258.

Klein, W. M. (2001). Post hoc construction of self-performance and other performance in self-serving social comparison. *Society for Personality and Social Psychology*, *27*(6), 744–754.

Kluger, A. N., & DeNisi, A. (1996). The effects of feedback interventions on performance: A historical review, a meta-analysis, and a preliminary feedback intervention theory. *Psychological Bulletin*, *119*(2), 254–284.

Kluger, A. N., & DeNisi, A. (1998). Feedback interventions: Towards the understanding of a double-edge sword. *Current Directions in Psychological Science*, *7*, 67–72.

Kulhavy, R. W. (1977). Feedback in written instruction. *Review of Educational Research*, *47*(1), 211–232.

Kulhavy, R. W., & Stock, W. A. (1989). Feedback in written instruction: The place of response certitude. *Educational Psychology Review*, *1*(4), 279–308.

Kulhavy, R. W., White, M. T., Topp, B. W., Chan, A. L., & Adams, J. (1985). Feedback complexity and corrective efficiency. *Contemporary Educational Psychology*, *10*, 285–291.

Kulik, J. A., & Kulik, C. C. (1988). Timing of feedback and verbal learning. *Review of Educational Research*, *58*(1), 79–97.

L'Hommedieu, R., Menges, R. J., & Brinko, K. T. (1990), Methodological explanations for the modest effects of feedback from student ratings. *Journal of Educational Psychology*, *82*(2), 232–241.

This content downloaded from
130.237.165.40 on Wed, 14 Jan 2026 09:55:34 UTC
All use subject to https://about.jstor.org/terms

Latham, G. P., & Lee, T. W. (1986). Goal-setting. In E. A. Locke (Ed.), *Generalizing from laboratory to field settings* (pp. 101–117). Lexington, MA: Lexington Books.

Lee, T. W., Locke, E. A., & Latham, G. P. (1989). Goal setting theory and job performance. In L. A. Pervin (Ed.), *Goal concepts in personality and social psychology* (pp. 291–321). Hillsdale, NJ: Lawrence Erlbaum.

Locke, E. A., & Latham, G. P. (1984). *Goal setting: A motivational technique that works*. Englewood Cliffs, NJ: Prentice Hall.

Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting and task performance*. Englewood Cliffs, NJ: Prentice Hall.

Lysakowski, R. S., & Walberg, H. J. (1982). Instructional effects of cues, participation, and corrective feedback: A quantitative synthesis. *American Educational Research Journal, 19*, 559–578.

Markus, H. (1977). Self-schemata and processing information about the self. *Journal of Personality and Social Psychology, 35*, 63–78.

Marsh, H. W. (1987). The big-fish-little-pond effect on academic self-concept. *Journal of Educational Psychology, 79*, 280–295.

Marsh, H. W. (1990). The influence of internal and external frames of reference on the formation of math and English self-concepts. *Journal of Educational Psychology, 82*, 107–116.

Marton, F., Dall'Alba, G., & Beaty, E. (1993). Conceptions of learning. *International Journal of Educational Research, 19*(3), 277–300.

McLaughlin, T. F. (1974). Effects of written feedback in reading on behaviorally disordered students. *Journal of Educational Research, 85*(5), 312–316.

Meyer, W. (1982). Indirect communication about perceived ability estimates. *Journal of Educational Psychology, 74*, 888–897.

Meyer, W., Bachmann, U., Hempelmann, M., Ploger, F., & Spiller, H. (1979). The informational value of evaluation behavior: Influences of praise and blame in perceptions of ability. *Journal of Educational Psychology, 71*, 259–268.

Mikulincer, M. (1988). Reactance and helplessness following exposure to unsolvable problems: The effects of attributional style. *Journal of Personality and Social Psychology, 54*, 679–686.

Moin, A. K. (1986). *Relative effectiveness of various techniques of calculus instruction: A meta-analysis*. Unpublished doctoral dissertation, Department of Mathematics, University of Syracuse, Syracuse, New York.

Moreland, R. L., & Sweeney, P. D. (1984). Self-expectancies and reactions to evaluations of personal performance. *Journal of Personality, 52*, 156–176.

Mueller, C. M., & Dweck, C. S. (1998). Praise for intelligence can undermine children's motivation and performance. *Journal of Personality and Social Psychology, 75*(1), 33–52.

Nadler, D. (1979). The effects of feedback on task group behavior: A review of the experimental research. *Organizational Behavior and Human Performance, 23*, 309–338.

Nelson-Le Gall, S. (1981). Help-seeking: An understudied problem-solving skill in children. *Developmental Review, 1*, 224–226.

Nelson-Le Gall, S. (1985). Help-seeking behavior in learning. *American Educational Research Association, 12*, 55–90.

Newman, R. S., & Schwager, M. T. (1993). Students' perceptions of the teacher and classmates in relation to reported help seeking in math class. *Elementary School Journal, 94*, 3–17.

This content downloaded from
130.237.165.40 on Wed, 14 Jan 2026 09:55:34 UTC
All use subject to https://about.jstor.org/terms

Okun, M. A., & Sasfy, J. H. (1977). Adolescence, the self-concept, and formal operations. *Adolescence, 12*, 373–379.

Page, E. B. (1958). Teacher comments and student performance: A seventy-four classroom experiment in school motivation. *Journal of Educational Psychology, 49*, 173–181.

Paich, M., & Sterman, J. D. (1993). Boom, bust and failures to learn in experimental markets. *Management Science, 39*, 1439–1458.

Paris, S. G, & Cunningham, A. E. (1996). Children becoming students. In D. C. Berliner & R. C. Calfee (Eds.), *Handbook of educational psychology* (pp. 117–147). New York: Macmillan.

Paris, S. G., & Winograd, P. (1990). Promoting metacognition and motivation of exceptional children. *Rase: Remedial & Special Education, 11*(6), 7–15.

Podsakoff, P. M., & Farh, J. L. (1989). Effects of feedback sign and credibility on goal setting and task performance. *Organizational Behavior and Human Decision Processes, 44*, 45–67.

Purdie, N., Hattie, J. A., & Douglas, G. (1996). Student conceptions of learning and their use of self-regulated learning strategies: A cross-cultural comparison. *Journal of Educational Psychology, 88*, 87–100.

Rummel, A., & Feinberg, R. (1988). Cognitive evaluation theory: A meta-analytic review of the literature. *Social Behavior and Personality, 16*(2), 147–164.

Ryan, A. M., & Pintrich, P. R. (1977). "Should I ask for help?" The role of motivation and attitudes in adolescents' help seeking in math class. *Journal of Educational Psychology, 89*, 329–341.

Sadler, R. (1989). Formative assessment and the design of instructional systems. *Instructional Science, 18*, 119–144.

Säljö, R. (1979). *Learning in the learner's perspective—I. Some commonsense conceptions* (Report No. 76). Gothenburg, Sweden: University of Gothenburg, Department of Education.

Schroth, M. L., & Lund, E. (1993). Role of delay of feedback on subsequent pattern recognition transfer tasks. *Contemporary Educational Psychology, 18*, 15–22.

Schunk, D. H., & Rice, J. M. (1991). Learning goals and progress feedback during reading comprehension instruction. *Journal of Reading Behavior, 23*, 351–364.

Sharp, P. (1985). Behaviour modification in the secondary school: A survey of students' attitudes to rewards and praise. *Behavioral Approaches with Children, 9*, 109–112.

Shepard, L. A., Flexer, R. J., Hiebert, E. J., Marion, S. F., Mayfield, V., & Weston, T. J. (1996). Effects of introducing classroom performance assessments on student learning. *Educational Measurement Issues and Practice, 15*, 7–18.

Shrauger, J. S., & Sorman, P. (1977). Self-evaluations, initial success and failure, and improvement as determinants of persistence. *Journal of Consulting and Clinical Psychology, 45*, 784–795.

Simmons, M., & Cope, P. (1993). Angle and rotation: Effects of feedback on the quality of learning. *Educational Studies in Mathematics, 21*, 375–382.

Skiba, R., Casey, A., & Center, B. A. (1985–1986). Nonaversive procedures in the treatment of classroom behavior problems. *Journal of Special Education, 19*, 459–481.

Smith, T., Snyder, C., & Handelsman, M. (1982). On the self-serving function of an academic wooden leg: Test anxiety as a self-handicapping strategy. *Journal of Personality and Social Psychology, 42*, 314–321.

Steinberg, L. (1996). *Beyond the classroom: Why school reform has failed and what parents need to do.* New York: Touchstone.

This content downloaded from
130.237.165.40 on Wed, 14 Jan 2026 09:55:34 UTC
All use subject to https://about.jstor.org/terms

Sterman, J. D. (1989). Misperceptions of feedback in dynamic decision making. *Organizational Behavior and Human Decision Processes, 43*, 301–335.

Sturges, P. T. (1972). Information delay and retention: Effect of information in feedback and tests. *Journal of Educational Psychology, 63*(1), 32–43.

Sturges, P. T. (1978). Delay of informative feedback in computer-assisted testing. *Journal of Educational Psychology, 70*(3), 378–387.

Suls, J., & Wan, C. K. (1987). In search of the false-uniqueness phenomenon: Fear and estimates of social consensus. *Journal of Personality and Social Psychology, 59*, 229–241.

Swann, W. B. (1985). The self as architect of social reality. In B. Schlenker (Ed.), *The self and social life* (pp. 100–125). New York: McGraw-Hill.

Swann, W. B., & Hill, C. A. (1982). When our identities are mistaken: Reaffirming self-conceptions through social interaction. *Journal of Personality and Social Psychology, 43*, 59–66.

Swann, W. B., Pelham, B. W., & Chidester, T. (1988). Change through paradox: Using self-verification to alter beliefs. *Journal of Personality and Social Psychology, 54*, 268–273.

Sweller, J. (1990). Cognitive processes and instruction procedures. *Australian Journal of Education, 34*(2), 125–130.

Swindell, L. K., & Walls, W. F. (1993). Response confidence and the delay retention effect. *Contemporary Educational Psychology, 18*, 363–375.

Tenenbaum, G., & Goldring, E. (1989). A meta-analysis of the effect of enhanced instruction: Cues, participation, reinforcement and feedback and correctives on motor skill learning. *Journal of Research and Development in Education, 22*, 53–64.

Tesser, A., & Campbell, J. (1983). Self-definition and self-evaluation maintenance. In J. Suls & A. Greenwald (Eds.), *Social psychological perspectives on the self* (Vol. 2, pp. 1–31). Hillsdale, NJ: Lawrence Erlbaum.

Thompson, T. (1997). Do we need to train teachers how to administer praise? Self-worth theory says we do. *Learning and Instruction, 28*, 49–64.

Thompson, T. (1998). Metamemory accuracy: Effects of feedback and the stability of individual differences. *American Journal of Psychology, 111*(1), 33–42.

Thompson, T. (1999). *Underachieving to protect self-worth: Theory research and interventions*. Avebury, UK: Aldershot.

Thompson, T., & Richardson, A. (2001). Self-handicapping status, claimed self-handicaps and reduced practice effort following success and failure feedback. *British Journal of Educational Psychology, 71*, 151–170.

Timperley, H., & Parr, J. (2005). *Literacy professional development project.* Wellington: New Zealand Ministry of Education.

Timperley, H. S., & Wiseman, J. (2002). *The sustainability of professional development in literacy*. Wellington: New Zealand Ministry of Education.

Trope, Y. (1975). Seeking information about one's own ability as a determinant of choice among tasks. *Journal of Personality and Psychology, 32*, 1004–1013.

Trope, Y. (1980). Self-assessment, self-enhancement and task performance. *Journal of Experimental Social Psychology, 16*, 116–129.

Van-Dijk, D., & Kluger, A. N. (2000, April). *Positive (negative) feedback: Encouragement or discouragement?* Retrieved September 2001 from http://www/huji.ac.il/unew/main.html

Van-Dijk, D., & Kluger, A.N. (2001). *Goal orientation versus self-regulation: Different labels or different constructs?* Paper presented at the 16th annual convention of the Society for Industrial and Organizational Psychology, San Diego, CA.

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Walberg, H. J. (1982). What makes schooling effective? *Contemporary Education Review*, *1*, 1–34.
Watkins, D., & Regmi, M. (1992). How universal are student conceptions of learning? A Nepalese investigation. *Psychologia*, *35*, 101–110.
Watkins, D., Regmi, M., & Astilla, E. (1991). The Asian learner-as-a-rote-learner stereotype: Myth or reality? *Educational Psychology*, *11*, 21–34.
Weiner, B. (Ed.). (1974a). *Achievement motivation and attribution theory*. Morristown, NJ: General Learning Press.
Weiner, B. (1974b). An attributional interpretation of expectancy-value theory. In B. Weiner (Ed.), *Cognitive views of human motivation* (pp. 51–70). New York: Academic Press.
Weiner, B. (1977). An attributional model for educational psychology. In L. Shulman (Ed.), *Review of research in education* (Vol 4., pp. 179–209). Itasca, IL: Peacock.
White, K. J., & Jones, K. (2000). Effects of teacher feedback on the reputations and peer perceptions of children with behavior problems. *Journal of Experimental Child Psychology*, *76*, 302–326.
Wilkinson, S. S. (1981). The relationship of teacher praise and student achievement: A meta-analysis of selected research. *Dissertation Abstracts International*, *41*(9–A), 3998.
Winne, P. H., & Butler, D. L. (1994). Student cognition in learning from teaching. In T. Husen & T. Postlewaite (Eds.), *International encyclopaedia of education* (2nd ed., pp. 5738–5745). Oxford, UK: Pergamon.
Wood, R. E., & Bandura, A. (1987). *Impact of conceptions of ability on self-regulatory mechanisms and complex decision-making* (Working Paper Series, 87–019). Sydney: University of New South Wales, Australian Graduate School of Management.
Yeany, R. H., & Miller, P. A. (1983). Effects of diagnostic/remedial instruction on science learning: A meta-analysis. *Journal of Research in Science Teaching*, *20*, 19–26.
Zimmerman, B. J. (2000). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts & P. R. Pintrich, (Eds.), *Handbook of self-regulation* (pp. 13–39). San Diego, CA: Academic Press.

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